Point

Adds data to analog channels by single points in both decimal and binary representation.

$$P(time),(ch1),(ch2),(ch3);

- ❖ Time:
  - ➢ Number (decimal or binary): time (x coordinate) of point
  - ➢ Special commands:
    - ▪ "-": Index of sample since connected
    - ▪ "-auto": Time since connected
    - ▪ "-tod": Time of day
- ❖ Ch1…Ch16 (maximum 16 values per point)
  - ➢ Number (decimal or binary): value of channel at this point
  - ➢ Special commands:
    - ▪ "-": Channel has no value at this point

Commas may be omitted between binary values.

Examples

Point in decimal

$$P123.00,1.10,2.20,3.30;
At time 123.00, channel 1 has value 1.10, channel 2 has value 2.20 and channel 3 has value 3.30.

$$P123.00,1.10,-,3.30;
At time 123.00, channel 1 has value 1.10, channel 2 has no value and channel 3 has value 3.30.

$$P-,1.10,2.20,3.30;
Time coordinate of this point equals index of this point since connection begun (start at zero, incrementing with each received point)

$$P-auto,1.10,2.20,3.30; or $$P-tod,1.10,2.20,3.30;
Time coordinate of this point equals time since connection (or time of day in second case) at which this point was received.

Point in binary

$$PU2??U2??U2??U2??;
Time and three values in unsigned integer data type. Notice, that it is not required to separate values by comma, however they can be used.

Combined

$$PU2??U2??,123.00,U2??;
Time and channels 1 and 3 have values in unsigned integer data type, channel 2 has value 123.00 at this point, notice that decimal value is separated by commas.

$$PU2??U2??,-,U2??;
Time and channels 1 and 3 have values in unsigned integer data type, channel 2 is empty at this point.

$$P-,U2??U2??U2??;
Time coordinate of this point equals index of this point since connection begun (start at zero, incrementing with each received point)

$$P-auto,U2??U2??U2??; or $$P-tod,U2??U2??U2??;
Time coordinate of this point equals time since connection (or time of day in second case) at which this point was received.

Channel

Adds whole set of data to one analog channel, data is in binary.

$$C(header);(data type)(data...........);

Different header types can be used depending on data type:

Unsigned int
$$C(ch),(time step),(length);U?(data...........);
$$C(ch),(time step),(length),(bits),(max);U?(data...........);
$$C(ch),(time step),(length),(bits),(min),(max);U?(data...........);
$$C(ch),(time step),(length),(bits),(min),(max),(zero index);U?(data...........);

Signed int
$$C(ch),(time step),(length);I?(data...........);
$$C(ch),(time step),(length),(zero index);I?(data...........);

Floating point
$$C(ch),(time step),(length);F?(data...........);
$$C(ch),(time step),(length),(zero index);F?(data...........);

- ❖ Ch: positive integer (decimal or binary): channel to write data in (1 … 16)
- ❖ Time step: number (decimal or binary): time interval between consecutive samples
- ❖ Length: positive integer (decimal or binary): number of samples (not bytes) in this channel
- ❖ Bits: positive integer (decimal or binary): number of used bits in data type (for calculating min and max)
- ❖ Min: number (decimal or binary): values will be remapped so that 0 is transformed to this value
- ❖ Max: number (decimal or binary): values will be remapped so that 2^{bits} is transformed to this value
- ❖ Zero index: positive integer or zero (decimal or binary): index of sample which should be at time 0. If omitted, first sample (index 0) is at time 0. Useful for pre-trigger.

Commas may be omitted between binary values.

Examples

Simple unsigned integer values
$$C1,0.001,20;U2??;
Data for channel 1, interval between samples is 0.001 seconds (first sample is at time zero), there are 20 samples, in 16bit unsigned integer (40 bytes after "U2").

Remapped unsigned integer values
$$C1,0.001,20,12,3.3;U2??;
Data for channel 1, interval between samples is 0.001 seconds (first sample is at time zero), there are 20 samples, in 16bit unsigned integer. Values are remapped so that 4096 (2^{12}) is 3.3V and 0 stays at 0.

$$C1,0.001,20,12,-1.5,1.5;U2??;
Data for channel 1, interval between samples is 0.001 seconds (first sample is at time zero), there are 20 samples, in 16bit unsigned integer. Values are remapped so that 4096 (2^{12}) is 1.5V and 0 is -1.5.

Float values
$$C1,0.001,10,5;F4??;
Data for channel 1, interval between samples is 0.001 seconds (first sample is at time zero), there are 10 samples, in 32bit float. Sample with index 5 (counting from zero) is at time equals 0, samples before this are at negative times.

Multiple channels interleaved
$$C1+2+3+4,0.001,32;U2??;
Data for channels 1, 2, 3 a 4. Hodnoty se v tomto pořadí střídají. Zadaná délka je délka všech dat dohromady (v tomto příkladu má každý kanál 8 vzorků).

Logic channel

Adds whole set of data to logic channels, data is in binary, unsigned integer type.

$$C(header);(data type)(data...........);

$$C(time step),(length);U?(data...........);
$$C(time step),(length),(bits);U?(data...........);
$$C(time step),(length),(bits),(zero index);U?(data...........);

- ❖ Time step: number (decimal or binary): time interval between consecutive samples
- ❖ Length: positive integer (decimal or binary): number of samples (not bytes) in this channel
- ❖ Bits: positive integer (decimal or binary): number of bits to show (starting from LSB)
- ❖ Zero index: positive integer or zero (decimal or binary): index of sample which should be at time 0. If omitted, first sample (index 0) is at time 0. Useful for pre-trigger.

Commas may be omitted between binary values.

Examples

$$C0.001,20;U2??;
Interval between samples is 0.001 seconds (first sample is at time zero), there are 20 samples, in 16bit unsigned integer (40 bytes after "U2"), all 16 bits are shown.

$$C0.001,20,12;U2??;
Interval between samples is 0.001 seconds (first sample is at time zero), there are 20 samples, in 16bit unsigned integer, only last 12 bits are shown.

$$C0.001,20,16,10;U2??;
Interval between samples is 0.001 seconds (first sample is at time zero), there are 20 samples, in 16bit unsigned integer, all 16 bits are shown (which must be specified in this header type, even though its redundant when all bits of type are used). Sample with index 10 (counting from zero) is at time equals 0, samples before this are at negative times.

Logic Point

Adds data to logic channels by single points.

$$B(time),(value),(bits);

- ❖ Time:
  - ➢ Number (decimal or binary): time (x coordinate) of point
  - ➢ Special commands:
    - ▪ "-": Index of sample since connected
    - ▪ "-auto": Time since connected
    - ▪ "-tod": Time of day
- ❖ Value: unsigned integer
- ❖ Bits: positive integer (decimal or binary): number of bits to show (starting from LSB)

Commas may be omitted between binary values.

Examples

$$B123.00,U2??;
Time as decimal. 16bit logic value.

$$BU2??U2??;
Time as unsigned integer. 16bit logic value.

$$BU2??U2??,12;
Time as unsigned integer. 12bit logic value.

$$B-auto,U2??; or $$B-tod,U2??;
Time coordinate of this point equals time since connection (or time of day in second case) at which this point was received.